



« novel Diagnostic Techniques for future particle Accelerators:
A Marie Curie Initial Training NETwork »

Carsten P. Welsch

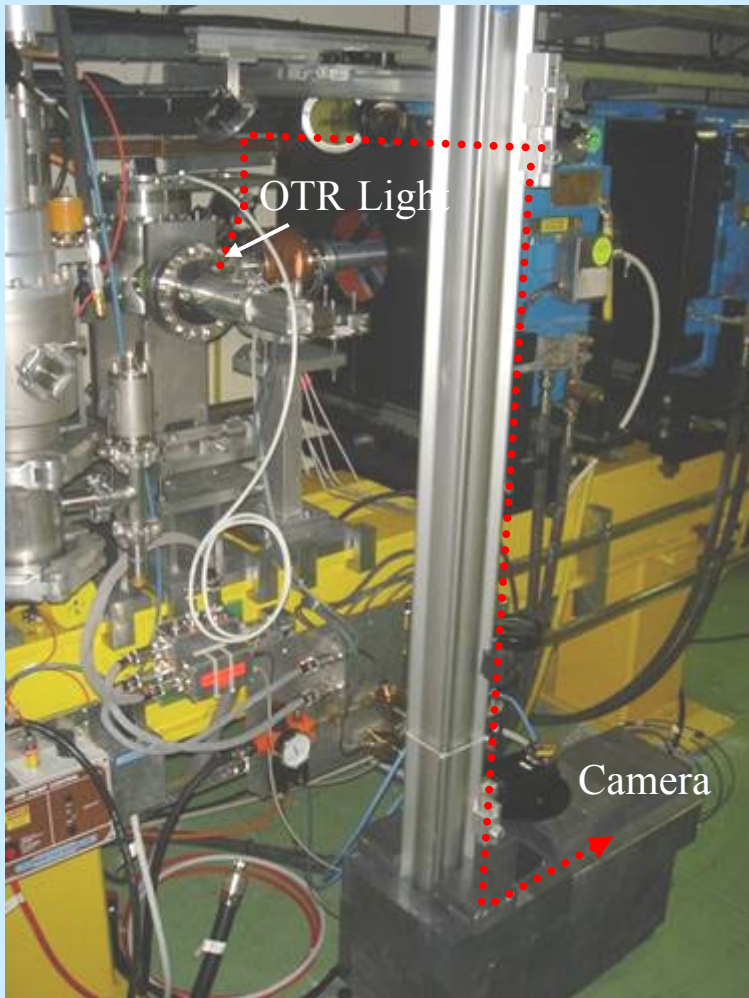
- On behalf of the DITANET Consortium -



Outline

- What is DITANET ?
- Involvement of Industry
- Research
- Training
- What does it mean to you ?

A „typical“ Monitor



- Material sciences
- Thermodynamics
- Electro-Magnetism
- Optics
- Mechanics
- Electronics
- Nuclear Physics
- ...

➡ Multi-disciplinary field !

What is DITANET ?

- One of the largest Marie Curie Initial Training Networks ever funded by European Union !
- Funding for 20 fellows (17 ESR and 3 ER)
- Gives industry an important role !
- Allows for inter-sectorial collaboration !
- Recognized importance of beam diagnostics at European level !

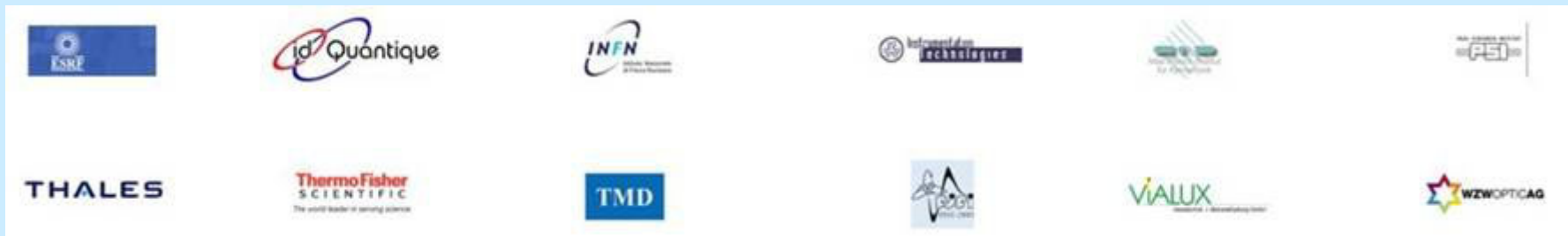
(in physics top 12, 2007 – under extreme competition)

The DITANET Consortium

Network Participants



Associated Partners



Including Partners From Industry

Full Network Partner	Offer research training & Recruit eligible researchers	Level 1
Associated Partner	Provide research training, complementary skills courses, (communication, enterprise cycles, innovation, IPR, ...) secondments	Level 2
	Member of the Supervisory Board: definition of skills requirements for targeted researchers	Level 3

Including Partners From Industry



Instrumentation Technologies
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54250 Solkan
France
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F: +33 (0)3 32 32 20 00
www.it-tech.fr

Dr. Carsten P. Welsch
Kirchhoff Institute for Physics
University of Heidelberg
Im Neuenheimer Feld 227
D-69120 Heidelberg

Solkan, 29 August 2007

Subject: DITANET collaboration

Instrumentation Technologies a strongly supports the idea of a diagnostics and welcomes the uniting the forces of industry an instrumentation, which is indisputable beam character

In this perspective we are willing (ESR) employed by GSI hosting DITANET network.

We foresee the training of the following to the User
- introduction to the User
- training in FPGA program
- integration of the device

GSI (Instrumentation Technology)
Dr. Marcus Schwicker, Beam Line
Planckstrasse 1, D-4291 Dan

Instrumentation Technologies c
Dr. Carlo Bocchetto, Director c
22, St-5250 Solkan, Slovenia,

Sincerely,
Rak Ušić
President and CEO
Instrumentation Technologies c

Components & Subsystems
RF & Microwave Sources - Valley
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THALES

ThermoFisher
SCIENTIFIC

September 21, 2007

Dr. Carsten P. Welsch
Kirchhoff Institute for Physics
University of Heidelberg
Im Neuenheimer Feld 227
D-69120 Heidelberg

Dear Dr. Welsch,

Thermo Fisher Scientific is a world-renowned software, services, consumables and reagents, line strongly supports the European Training Network

The CIDTEC Cameras & Imagers product line centers in the past, and we encourage your dynamic field.

Thermo Fisher Scientific's CIDTEC Cameras Network's supervisory board in order to ensure technology.

Our product line will also actively contribute to our Liverpool, NY USA facility for a total of 8 (eight) months. This ambitious research system architectures, image acquisition software for her education and to provide broader technical

Sincerely,

Tony Chapman

Tony Chapman
Sales and Marketing Director

Michael J. Pilon, Ph.D.
General Manager

VIALUX GmbH, Roschener Straße 88, D-69126 Chemnitz

Dr. Carsten P. Welsch

Kirchhoff Institute for Physics
University of Heidelberg
Im Neuenheimer Feld 227
D-69120 Heidelberg

DITANET

Dear Dr. Welsch,

I refer to our recent communication concerning the idea of a European diagnostics. We have already successful Universities and research centres and are covered within DITANET.

VIALUX is willing to actively contribute to hosting him for a total duration of 4 weeks. We are planning on a work on 3D object

With kind regards
VIALUX GmbH

Dr. Roland Hoffing
President/CEO
Technology and Sales

The world leader

VIALUX
Messtechnik + Serviceleistung GmbH

TMD

TMD Technologies Limited

Professor Grahame Blair
Royal Holloway College
University of London
Egham
Surrey, TW20 0EX

Dear Professor Blair,

Re: Novel Diagnostic Technology
Proposal to the Marie Curie

TMD Technologies Limited (TMD) is a £14M, of which 70% is exported.

TMD operates in the high power RF market of microwave tubes, high voltage power commercial, scientific and medical applications

The Board of Directors of TMD Technologies support the endeavors of the DITANET objective of attracting and training students

TMD is a founder member of the High military, medical, scientific applications variety of schemes. TMD are active in designed and manufactured special arm

TMD is an SME, thus a small company in this endeavour only because we have thus we win large contracts in the USA. This technology lead will only be made graduates.

TMD is thus very pleased to be associated to collaborating with your team with extensive

Yours Sincerely

Howard Smith
Director

Registered Office: Southwold Way, Hove

Belgisch, 24. August 2007
RE: Internship for PhD-Student at WZWOPTICAG

Dear Dr. Welsch,

WZWOPTICAG supports the idea of a European Training Network in the field of accelerator beam diagnostics. We have already long-standing and very positive experience in close collaboration with partners from Universities and research centres worldwide.

Our company strongly encourages that industry-relevant aspects are covered within DITANET and we are willing to actively contribute to the training of one early-stage researcher (ESR) by hosting him/her for the duration of two weeks during the time frame of the DITANET network.

During the stay, the trainee will be given an insight into daily work in the optical industry, in particular the layout of complex optical systems, lens design and the practical integration of elements into existing setups.

We look forward to a future collaboration.

Best regards

Wilfried Ockers
Managing Director
WZWOPTICAG

WZWOPTICAG
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Tel: +41 71 7321214
Fax: +41 71 7321240
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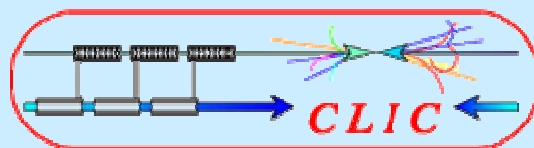
HELMHOLTZ
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Examples from the Research Program



XFEL

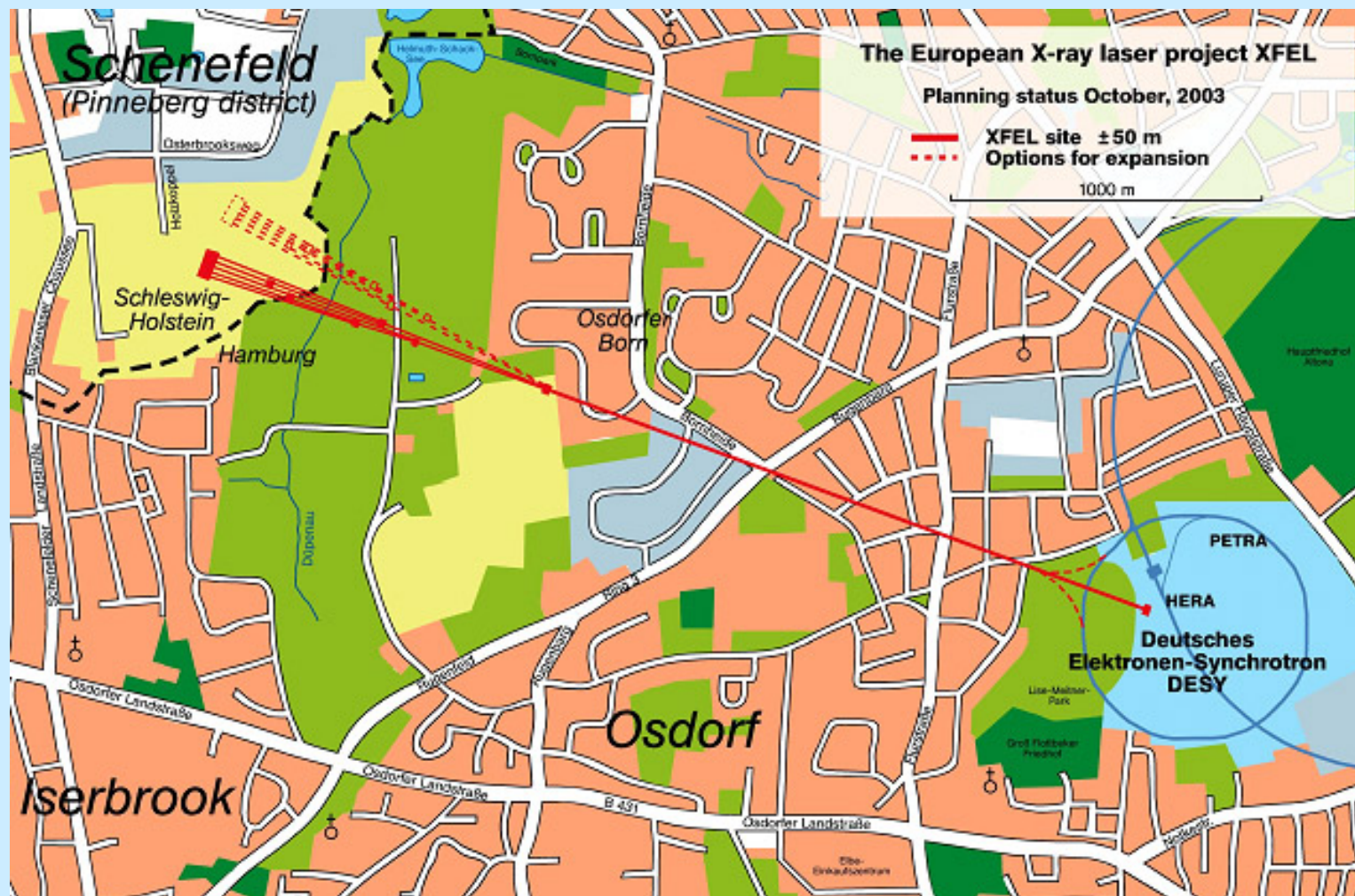


CTF3



USR @ F(L)AIR

The XFEL Project



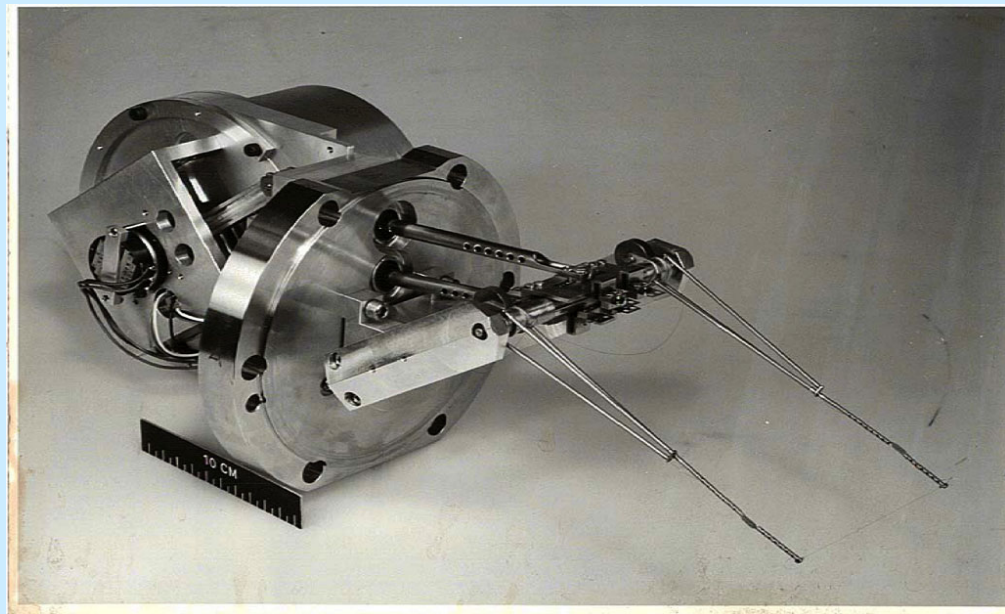
K. Wittenburg

Wire Scanners

..established for measurements in accelerators.

Advantages:

- Resolution: 1 μm
- Reliable
- Direct



K. Wittenburg

c.welsch@gsi.de

Challenge: Heat Load on Wire

$$-\frac{dE}{dx} = \frac{4\pi}{m_e c^2} \cdot \frac{n z^2}{\beta^2} \cdot \left(\frac{e^2}{4\pi\epsilon_0} \right)^2 \cdot \left[\ln \left(\frac{2m_e c^2 \beta^2}{I \cdot (1 - \beta^2)} - \beta^2 \right) \right]$$

$$T = C \cdot \frac{dE}{dx} \cdot d' \cdot N \cdot \frac{l}{c_p \cdot G} [^{\circ}\text{C}]$$

$$T_{\text{max}} \sim 2000^{\circ}\text{C}$$

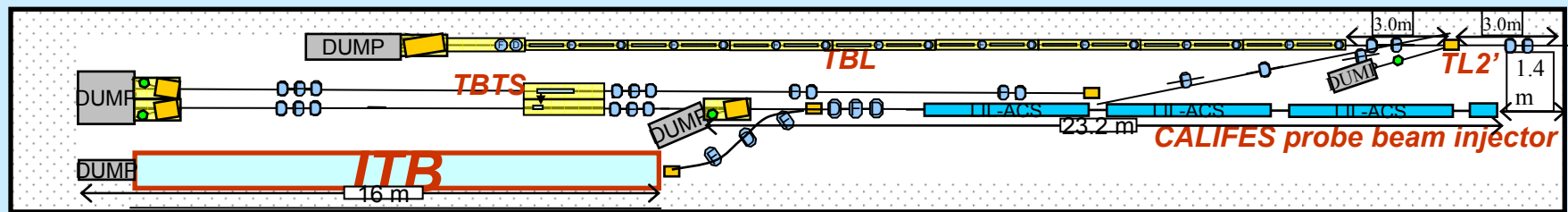
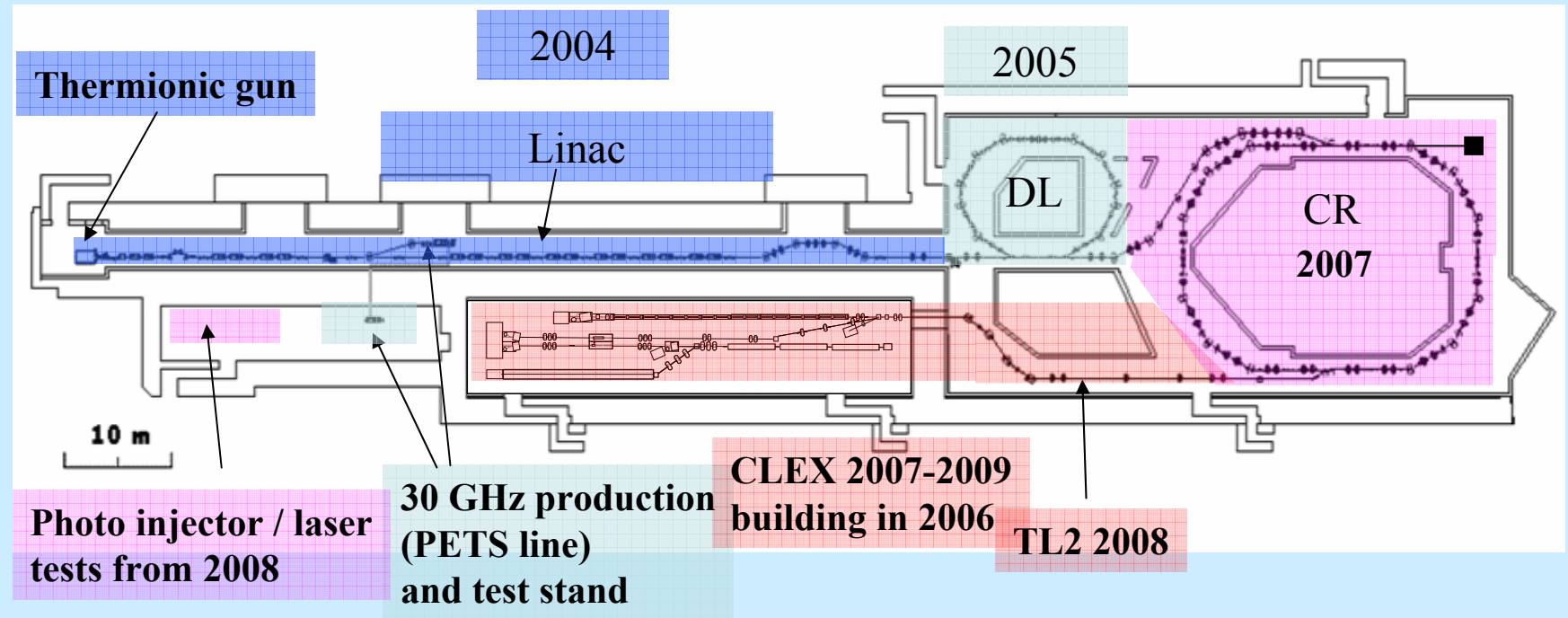
$$N = \frac{d' \cdot f_{\text{rev}}}{v} \cdot (NB \cdot n_{\text{Bunch}})$$



Required: Speed of 10-20 m/s with 1 μm resolution.

K. Wittenburg

CTF3 - Overview



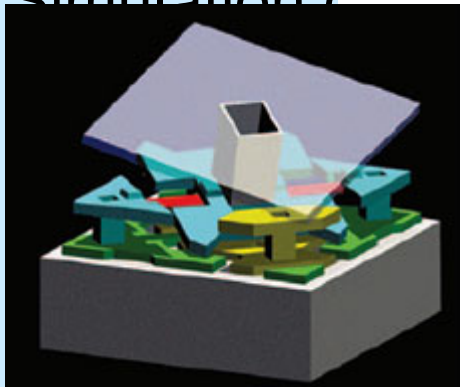
G. Blair, E. Bravin, T. Lefevre

CTF3: An Ideal Testing Platform

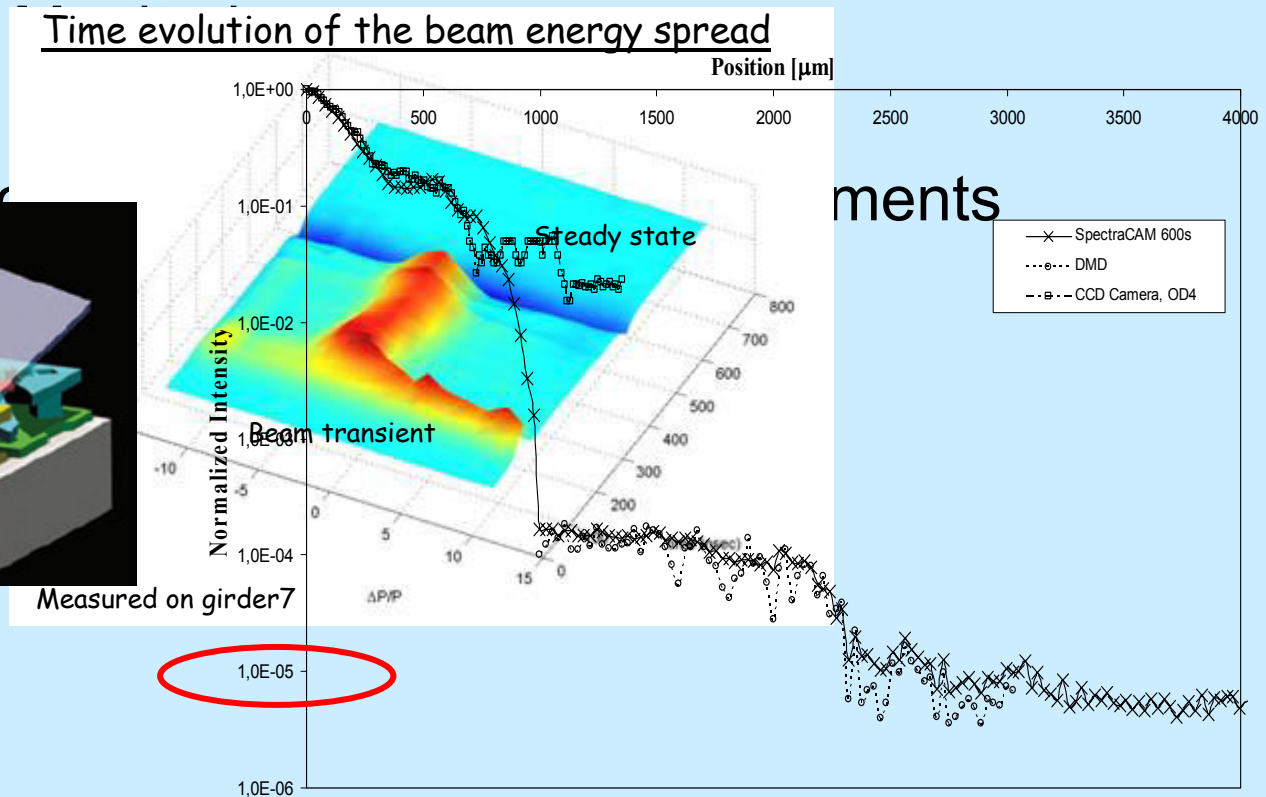
- Time-resolved spectroscopy

- Beam Halo

- Simulation

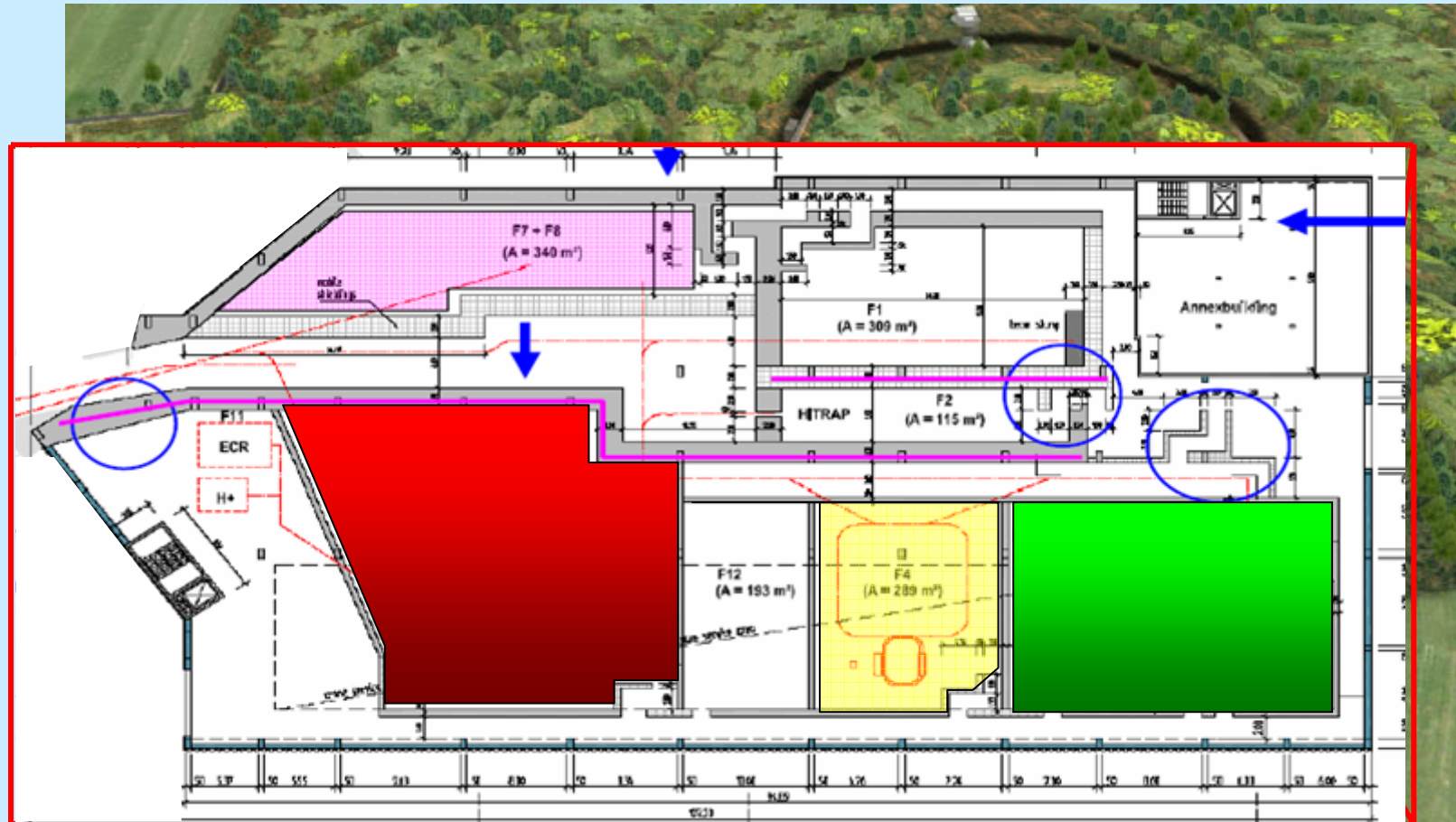


Time evolution of the beam energy spread



G. Blair, E. Bravin, T.Lefevre

FLAIR @ Facility for Antiproton and Ion Research

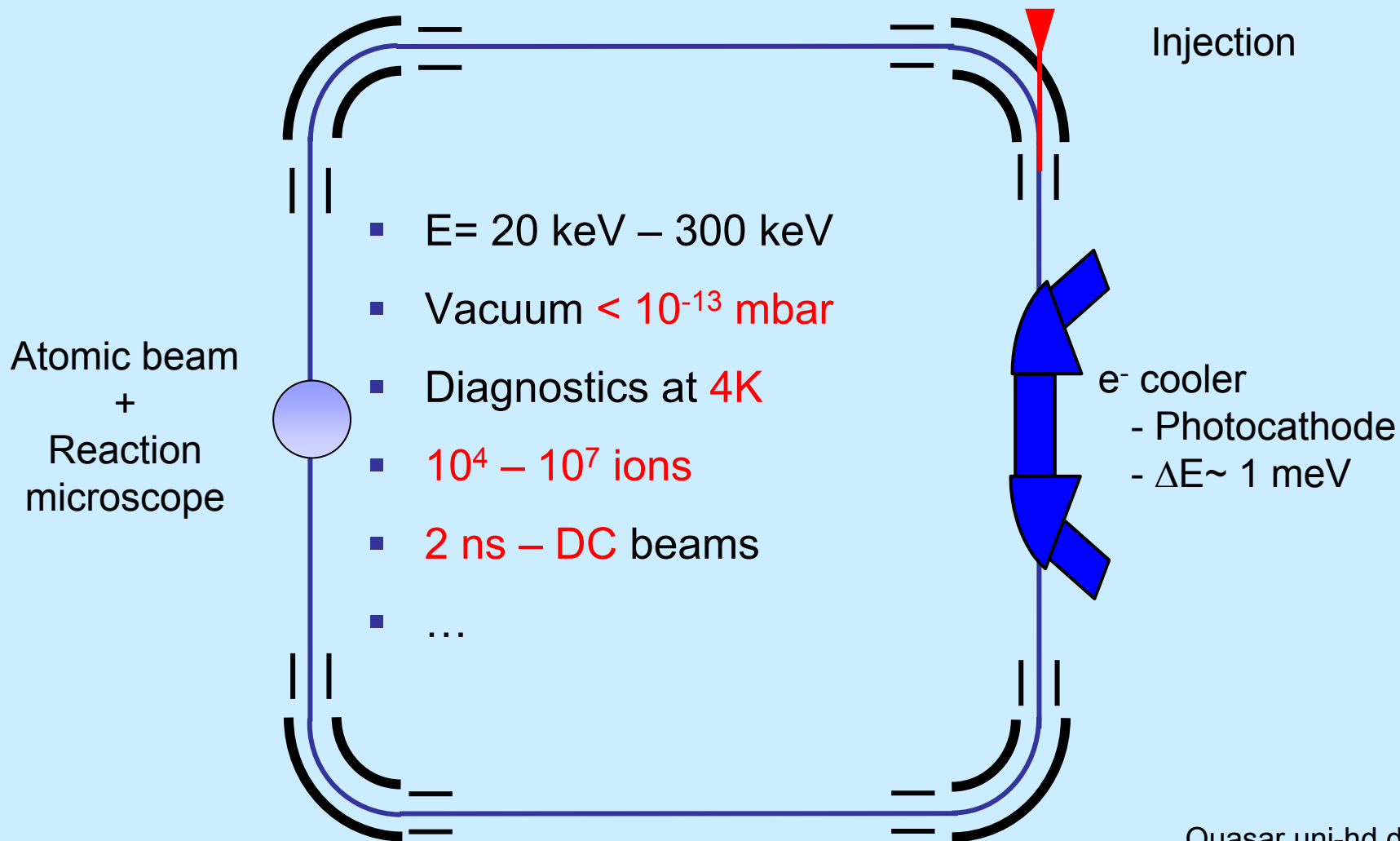


30 MeV - 300 keV

300 keV - 20 keV

keV - ... eV

USR - Challenges



- Local training by host
- Network-wide schools on diagnostic techniques
- Inter-network exchange of researchers
- Secondments to partners from industry
- Training in complementary skills



Motivation: *Ideal* Training.

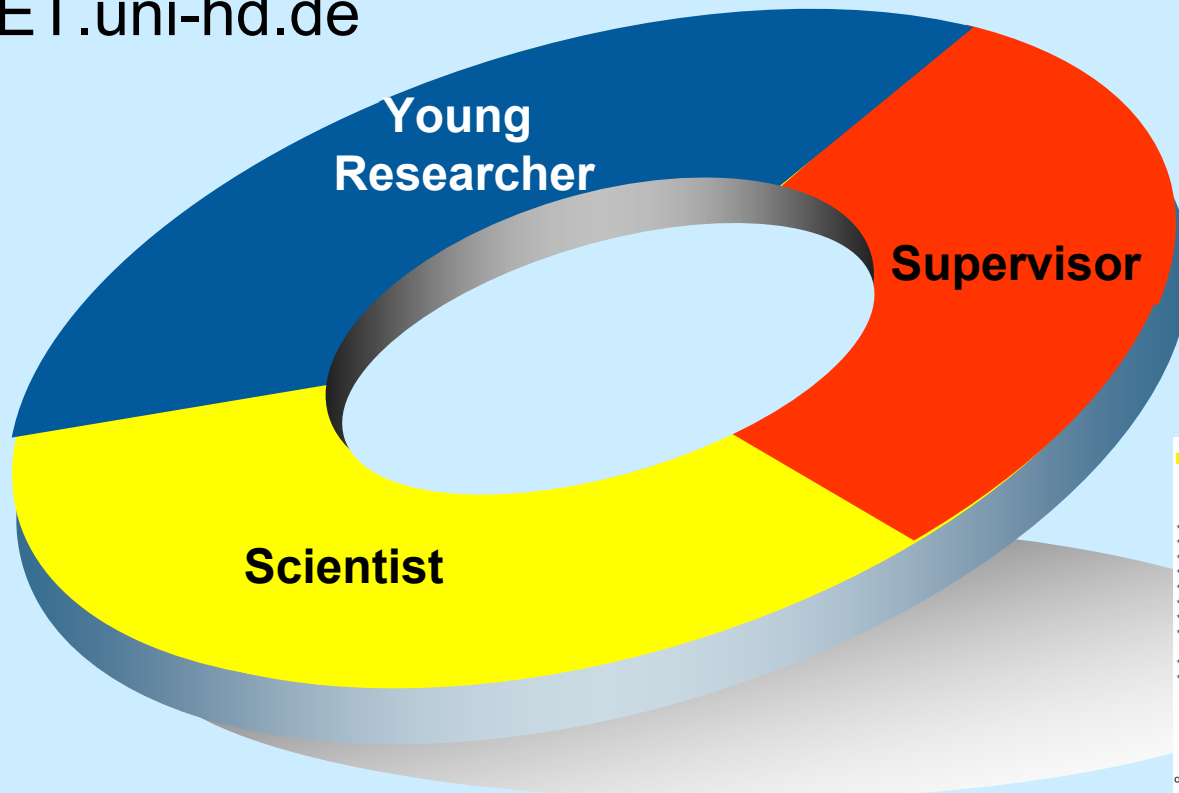
- DITANET schools in 03/2009 (London) and 09/2010 (Stockholm)
- DITANET conferences in 2009 and 2011 (DIPAC ?!)
- Mini-Symposia, workshops throughout 4 years



Open to external participants.

What DITANET means to you

DITANET.uni-hd.de



Join in !

DITANET
Diagnostic Techniques for particle accelerators - a European Network

- University of Heidelberg, Germany
- CEA, Saclay, France
- CERN, Geneva, Switzerland
- DESY, Hamburg, Germany
- GSI, Darmstadt, Germany
- HTI GmbH, Heidelberg, Germany
- IFIN-HH, Magurele, Romania
- Royal Holloway University of London, UK
- Stockholm University, Sweden
- University of Seville, CNA, Spain

Open Positions at the Marie Curie Initial Training Network DITANET


Associated Partners

c.welsch@gssi.de

Conclusion


- Unique oppo
- Developmen
- centers, Univ
- Innovative ap
- Many events
- Stimulation c

between research
sector;
young researchers;
community;
beam diagnostics.



DITANET
Diagnostic Techniques for particle Accelerators - a European Network

- ★ University of Heidelberg, Germany
- ★ CEA, Saclay, France
- ★ CERN, Geneva, Switzerland
- ★ DESY, Hamburg, Germany
- ★ GSI, Darmstadt, Germany
- ★ HIT GmbH, Heidelberg, Germany
- ★ IFIN-HH, Magurele, Romania
- ★ Royal Holloway
University of London, UK
- ★ Stockholm University, Sweden
- ★ University of Seville, CNA, Spain




Open Positions at the Marie Curie Initial Training Network DITANET

DITANET aims for developing beyond-state-of-the-art diagnostic techniques for accelerator facilities and to train young researchers within a European network between several major research centers, leading Universities, and partners from industry.

DITANET covers a wide range of multi-disciplinary topics such as

- beam profile measurements of ion and electron beams,
- development of novel particle detection techniques,
- high-resolution beam position measurements.

Associated Partners



Each researcher will benefit from a wide ranging training program that will take advantage of both local and network-wide activities, as well as of schools, conferences, and workshops. Most positions are for starting on August, 1st 2008 or soon thereafter.

You will find more information about DITANET and the application details at: <http://www.ditanet.uni-hd.de>

Contact and further details:
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Kierchhoff Institute for Physics
University of Heidelberg
Im Neuenheimer Feld 227
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carsten.welsch@kip.uni-heidelberg.de

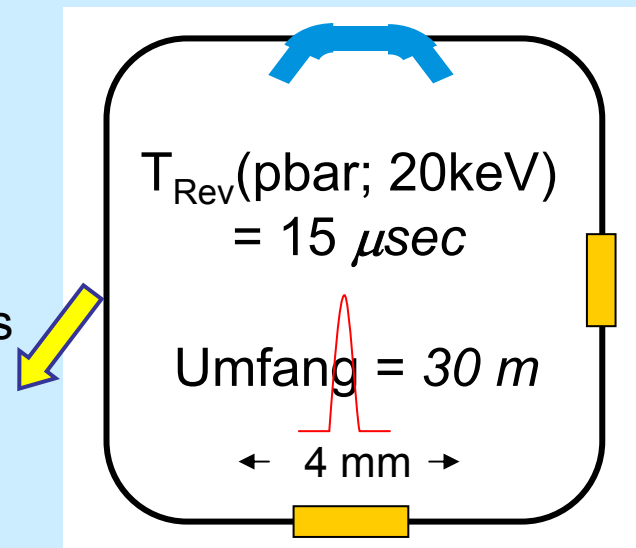
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a copy !!!

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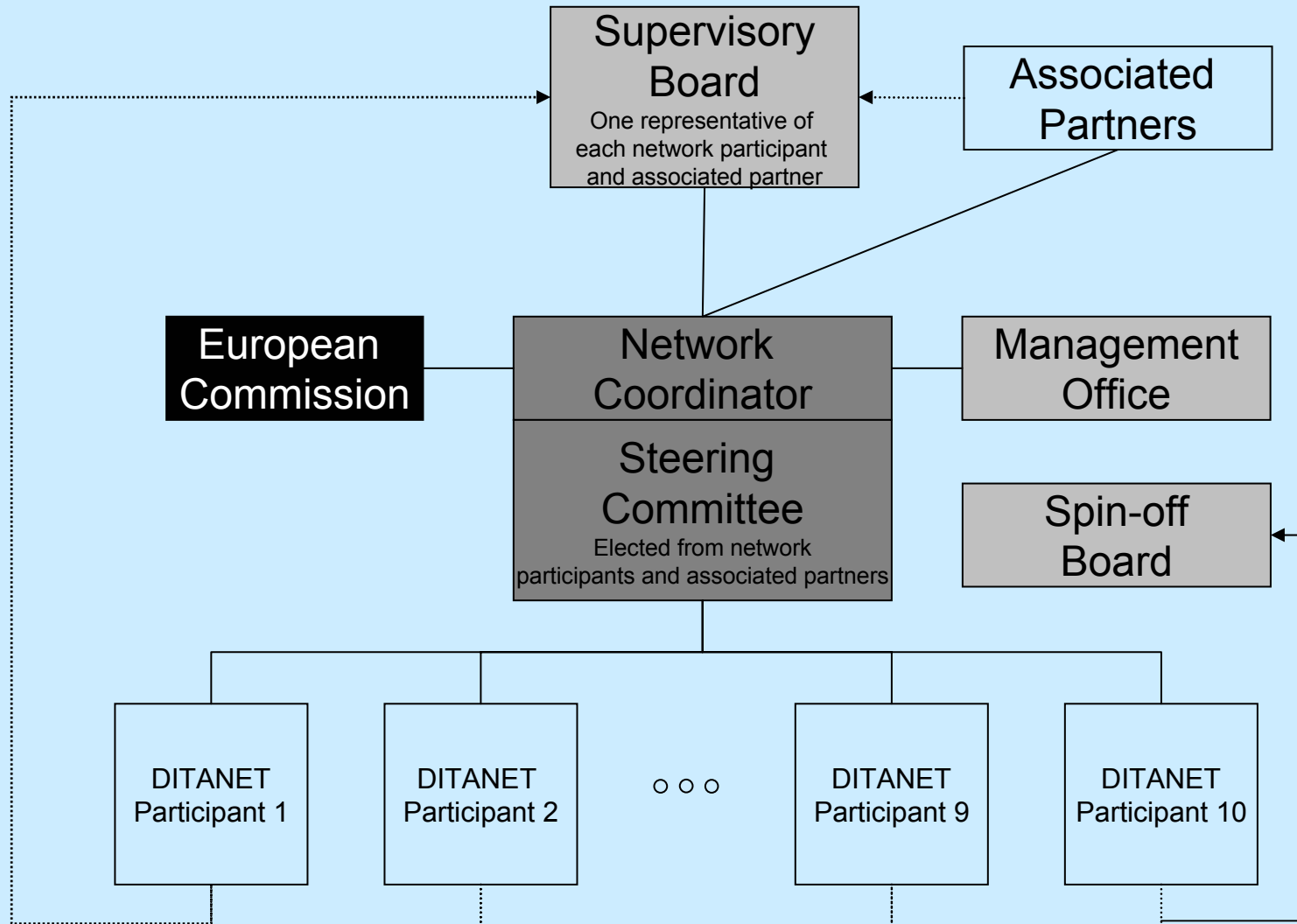
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USR - Goals

- Variable to lowest energies
 - 300 keV ~ **20 keV**
- High luminosity for in-ring experiments
- Well-defined extracted beams:
 - Small emittance
 - Small momentum spread
- Multi-user operation:
 - 2 straight sections for **in-ring** experiments
 - **Slow** and fast extraction
 - Additional beam lines possible
- Central requirements
 - $\Delta t \sim 500$ nsec for Injection in traps
 - $\Delta t \sim 2$ nsec / 10^4 ions for collision studies



Management Structure

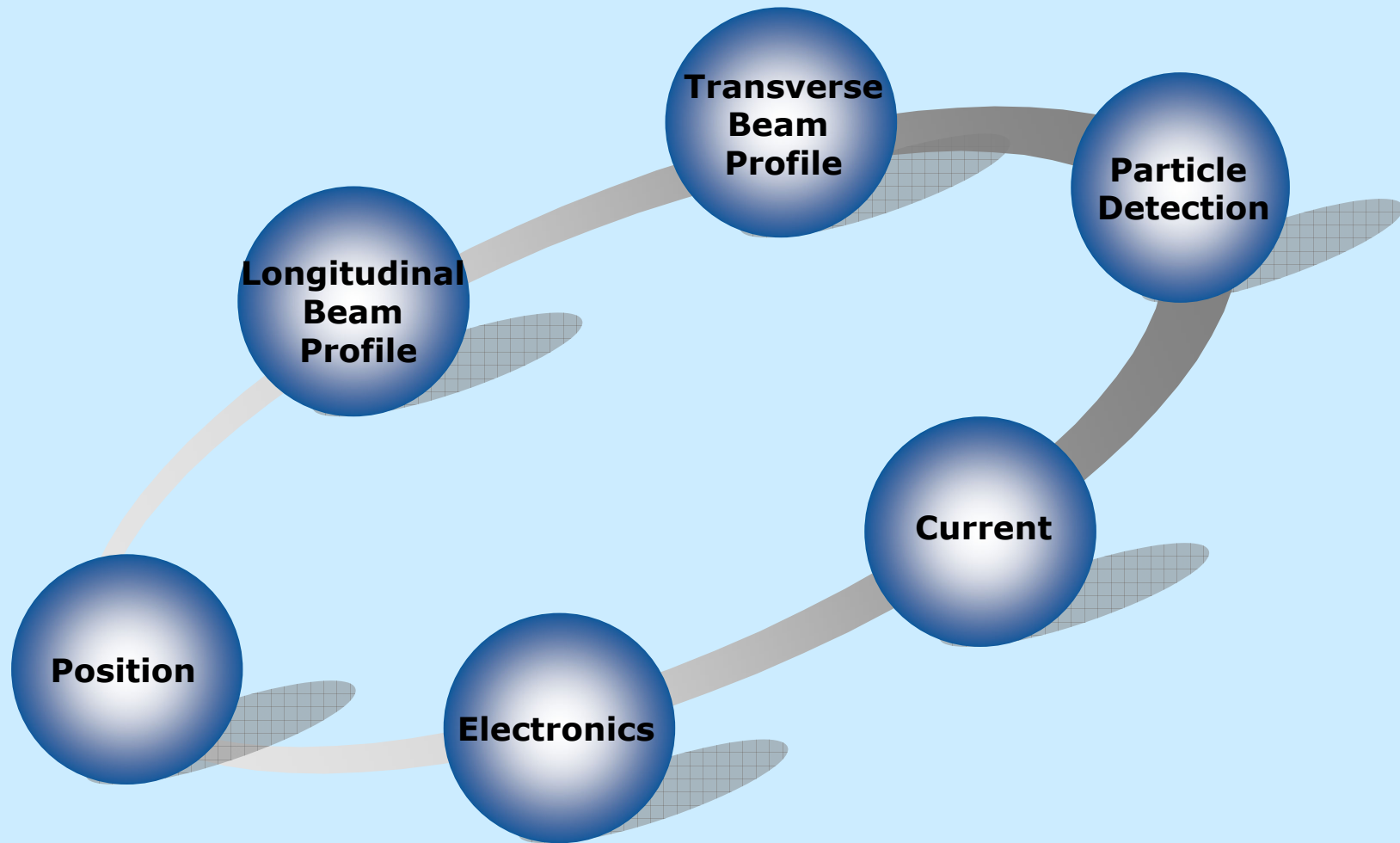


- Development of beam diagnostic techniques for future particle accelerators (LHC, FAIR, XFEL, and small-scale projects)
- Interdisciplinary approach
- Close collaboration with partners from industry

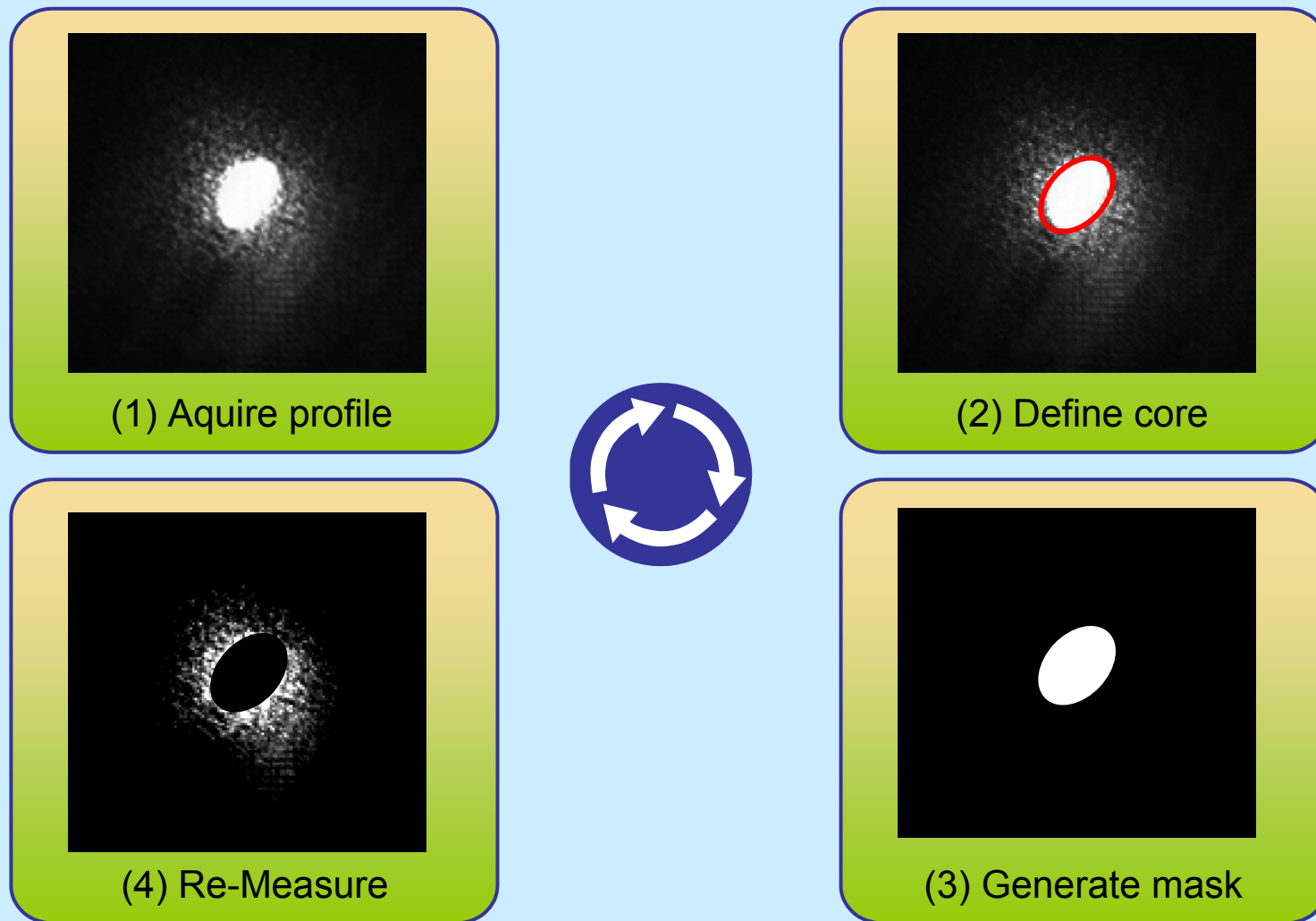


Aim:XXX

Research: Work Packages



Measurement



Recruitment Strategy

After acceptance

Final Definition

of all career development plans.

Formalizing secondments and time schedule.

DITANET kick-off meeting

+ 6 weeks

Publication of Positions

online and in relevant international journals.

Direct contact to prospective candidates.

End June

Screening of Applications

Criteria:
letter of intent, academic records, two letters of recommendation

In case several candidates are eligible:
Selection board

+ 4 weeks

Interviews and Selection Board

Criteria:
international competition, direct comparison between applicants.

Ensure gender balance, equal opportunities to candidates from within/outside network.

Soon thereafter

Decision

Based on agreement between host team, thematic partners and coordinator.

Goal

Fill all positions until september 2008.

Auswahl von Kandidaten

		Eligibility Criteria at the time of recruitment	Duration of appointments
INITIAL TRAINING	Early stage researchers ($\geq 80\%$)	$0 \leq \text{Research experience} \leq 4 \text{ years}$ No PhD	3-36 months
	Experienced researchers	PhD or at least 4 years of research experience & Research experience $\leq 5 \text{ years}$	3-24 months
Transfer of NEW COMPETENCES	Visiting scientists (<i>a limited number</i>)	Experienced researchers (experience $\gg 4 \text{ years}$) with outstanding stature in international training and collaborative research	$\geq 1 \text{ month}$ Multiple stays